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January 30, 2013

State of Delaware, DNREC  
Site Investigation & Restoration Section  
Attn: John G. Cargill, IV, P.G.  
391 Lukens Drive  
New Castle, DE 19720

RE: Revised Work Plan / SAP Plan  
Additional Groundwater Evaluation  
Procino Plating Facility (DE-0344)  
Blades, Sussex County, Delaware  
P.N. 11-1027.C

**RECEIVED**

**JAN 31 2013**

**DNREC - SIRS**

Mr. Cargill:

At our November 16<sup>th</sup> meeting, you indicated that DNREC would require additional groundwater evaluation at the Procino Property to include:

- further investigation to determine the extent of the shallow chromium plume to the east and to the south of the existing Geoprobe wells, and
- an evaluation of deeper stratigraphy, below the depth of 29 feet sampled to date, to assess the potential presence of clay layers and to characterize the water quality in the deeper aquifer lying between the Procino Property and the neighborhood to the west-southwest.

In order to collect the requested information, we propose the scope of work described below, depicted on the accompanying figure, and summarized on the attached DNREC SAP Template, each of which have been modified in accordance with SIRS comment letter dated January 17, 2013.

**Shallow Aquifer Delineation:**

Three (3) locations are tentatively selected for the installation of a shallow monitor well, as shown on Figure 1. These locations can be modified somewhat either at SIRS' direction or if access agreements with the property owners are problematic. We would like to minimize the number of affected parcels so as to minimize imposing on the Procino's neighbors.

The northeasterly well is situated so as to determine the eastern boundary of the shallow plume. The two southerly wells are intended to determine the southern boundary of the shallow plume. The results of the groundwater samples from these wells will be used to either confirm or to modify the general distribution of total chromium in the shallow aquifer as depicted in Figure 2. These three new wells will be constructed in the same manner (by Geoprobe<sup>TM</sup>) and with the same construction specifications as MW-7, MW-8 and MW-9 which were installed for the May 2012 phase of the groundwater evaluation.

### **Deep Aquifer Investigation:**

Two (2) locations have been selected for the installation of deep monitor wells as shown on Figure 1. These locations were selected to create a "nest" (pair) with existing shallow wells MW-8 and MW-9 to enable the measurement of the vertical gradient (up or down) in the well vicinity. These locations also lie downgradient from the source area between the source and the nearest private well #8

Ex. 6 Personal Privacy (PP) thus could serve as sentry wells in a long-term monitoring program.

The deep wells will be constructed as double-cased wells using a Hollow Stem Auger Rig with the specifications as follows:

A 12-inch diameter auger boring will be advanced to a depth of 25 feet, which is above the clay encountered at 27 feet in the borings for MW-8 and MW-9. The depth of the clay contact will be confirmed using continuous split-spoon sampling beginning at 25 feet. A 6-inch casing constructed of threaded flush joint PVC will be grouted into this hole. Below this depth, the hole will be advanced by 2-foot increments using continuous 2-ft split-spoon sampling to an estimated total depth of 55 feet below grade through 4-inch diameter augers to permit an inspection and descriptive logging of the geologic units lying between 25 feet and 55 feet below grade.

A monitor well will be constructed inside the augers using threaded flush joint 2-inch diameter PVC 10-slot screen with gravel pack. Either a 5 foot section or a 10-foot section of screen will be installed, depending upon the thickness of any sandy layers below the clay and the DNREC-selected terminal depth of 55 feet. The well above the screen extending to a 2-foot stickup above grade, will be constructed of threaded flush joint 2-inch diameter PVC casing which will be grouted into the annular space above the gravel pack. Actual well construction may vary somewhat based on the stratigraphic units encountered during drilling; the screen will be placed across a sandy interval lying below encountered clayey units (if any), and may be reduced to a 5-foot length to correspond to the thickness of the sand.

**Number of Deep Wells:** A third deep well has been included as a contingency to this effort at the location shown on Figure 1, to provide an additional pair with one of the new shallow wells installed for this phase. The trigger for the installation for the third deep well is IF differences are observed in the subsurface stratigraphy (the layers of clay especially) during the installation of Deep Well #1 as compared to Deep Well #2. IF Deep Well #1 and Deep Well #2 are similar in the depth, thicknesses and types of encountered units (sand, silty sand, clay, etc.), then the stratigraphy of the subsurface will be interpreted to be relatively homogeneous and the third deep well will not be installed.

**Well Depth:** The terminal depth of 55 feet was requested by SIRS in their comment letter of January 17<sup>th</sup>. A depth of 60 feet represents the basal depth of any clay unit reported in drillers logs, i.e., the depth at which the subsurface is described as "SAND" on the drillers logs from four (4) nearby wells (Pc34-07 and -08, the Town of Blades wells; Pc34-08 a well along Market Street; and Pc34-09 a well along west 6<sup>th</sup> Street). The descriptive logs of those wells were used to construct two cross-sections through the area, as we provided to you in our November 16 meeting. If clay without sufficient sandy zones for well placement (e.g., less than 4 feet thick) is still present upon reaching the terminal depth of 55 feet requested by SIRS, we plan to continue drilling until a 4-ft thick sandy layer is encountered below the clay in order to be able to install a well, and thereby confirm by groundwater sampling whether the total chromium found in the shallow aquifer is present below the clay, if clay is

actually encountered. The actual well depth and placement of the screened interval will be determined on the basis of encountered stratigraphic conditions during drilling.

Well Development: After installation, the 3 new shallow Geoprobe™ wells and the 2 (or 3) new deep wells will be developed by the drillers using surging and pumping techniques to remove fine particulates from the well screens.

#### Investigation Derived Wastes:

**SOIL:** Because soil samples previously collected at the plant source area had a maximum chromium concentration of 199 mg/kg (see Table 1 attached), it is considered highly unlikely that soil cuttings at any offsite location will contain chromium at concentrations of potential concern, i.e., above DNREC's Reporting Level / Screening Level of 214 mg/kg. Wells to depths of 25 feet already exist (MW-8 and MW-9) beside the proposed locations for the new deep wells, with total Cr groundwater concentrations of 23.7 ug/L (MW-8 at 23 ft) and below 1.0 ug/L (MW-9 at 25.5 ft). In consideration of those very low ppb chromium levels, the soil cuttings from depths to 25 feet will be spread out on the surface.

However, if DNREC feels that it is warranted, the soil cuttings from the 25 ft to 55 ft depths of the augered wells will be staged on, and covered by, thick plastic sheeting until lab results have been received. One 10-point composite sample will be collected from each well's soil pile and submitted to the lab for total chromium analysis. If results are below DNREC's Screening Level of 214 mg/kg (residential use), the soil cuttings will be spread on the ground surface and seeded.

**GROUNDWATER:** Development water from the 5 new wells and the pre-sampling purge water for all 7 Geoprobe wells (4 onsite and 3 offsite) and from 2 (3) new deep wells to be sampled using EPA's Low Flow (Zero Drawdown) methodology, will be contained in 55-gallon drums until groundwater sample lab results have been received.

Well Sampling: No sooner than 1 week after installation and development, the three new shallow wells and existing wells MW-6, MW-7, MW-8 and MW-9 will be sampled at two depths within the 20-foot screened intervals for total chromium. The 2 (or 3) deep wells will be samples for total chromium and total cyanides from the middle of the 10-foot screened interval. Sampling will be conducted using EPA Low-Flow methods. Sample numbers are provided on the attached DNREC SAP.

#### Elevation Survey of the New Wells

After installation of the new wells described above, Ten Bears Environmental personnel will conduct a relative elevation survey of the top of the PVC well casings which will be tied into the existing well casing elevation data. Depth to water measurements will be made in all site wells prior to the sampling event and a site-wide map of groundwater flow direction will be developed.

#### Not-In-Use Residential Wells

At the November 16<sup>th</sup> meeting we discussed the possibility of trying to access the old private wells at the residences to the south of the Procino facility. Because we were unable to discover any information regarding the well depths or screened intervals for most of those wells, or even if they still are present, we have postponed further investigation at this time.

## Re-Sampling of One Residential Well

In order to determine the stability, or possible increase or decrease of chromium measured in well #8, one of the residential wells sampled for DNREC SIRS by the Department of Public Health, we will contact the owners to obtain permission for Ten Bears to collect another sample for analysis of total chromium.

## Summary

Ten Bears has developed a work scope that is intended to satisfy DNREC SIRS and will provide the information DNREC requested at the November 16<sup>th</sup> meeting, including:

- Three new shallow wells to determine the extent of the shallow chromium plume to the east and to the south of the existing shallow wells, and re-sampling of MW-6 thru MW-9;
- Two new double-cased wells screened in the deeper aquifer at locations between the Procino Property and the neighborhood to the west-southwest. Continuous split-spoon sampling will evaluate the stratigraphy below a depth of 25 feet to determine the subsurface lithology including the occurrence, thickness and depth of clay layers (if any). Groundwater sampling for total chromium will determine whether it is present in the deeper aquifer at this vicinity.
- Another sample from Domestic Well #8 to be obtained by Ten Bears personnel.

Ten Bears will summarize the groundwater sample results once they are received from the laboratory for submission to DNREC SIRS, along with the aforementioned updated groundwater flow direction map.

If you have any questions regarding the groundwater investigation proposed herein, please feel free to contact us.

Sincerely,

TEN BEARS ENVIRONMENTAL ASSOCIATES COMPANY

**Ex. 4 CBI**

Senior Geologist

**Ex. 4 CBI**

Senior Environmental Engineer

### Attachments:

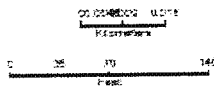
Figure 1	Proposed Groundwater Investigation Well Locations
Figure 2	Estimated Chromium Isoconcentrations in Shallow Groundwater
Table 1	Procino Plant Soil Sample Results
DNREC SAP Table (revised)	

State of Delaware

Delaware  
DataMIL  
Geological Survey

**Ex. 9 Wells & Ex. 6 Personal Privacy**

Scale 1:1,200



Data on map are based on Delaware framework data layers. The Delaware DataMIL is maintained by the Delaware Geological Survey (DGS) and served via the Delaware Department of Technology and Information (DTI) Internet.

DataMIL Mini Map

Magnetic Declination  
Approx. 11 m 15



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**FIGURE 1 - PROPOSED GROUNDWATER INVESTIGATION**

PROCINO PLATING PROPERTY

BLADES, SUSSEX COUNTY, DELAWARE

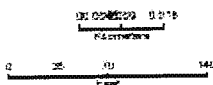
DATE:	11/27/2012	JOB NUMBER:	11-1027.B
DRAWN BY:	EWR	SCALE:	as noted
CHECKED BY:		FIGURE NO:	1
FILE NO:	11-1027.A-FIGS	SHEET	1 OF 1

# State of Delaware

Delaware  
DataMIL  
1/23/2013

## Ex. 9 Wells & Ex. 6 Personal Privacy

Scale 1:1,200



Data on map are based on Delaware framework data layers. The Delaware DataMIL is maintained by the Delaware Geological Survey (DGS) and served via the Delaware Department of Technology and Information (DTI) Internet.

Magnetic Declination  
Approx. 11 mts

DataMIL Mini Map



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### FIGURE 2 - ESTIMATED CHROMIUM ISOCONCENTRATIONS IN SHALLOW GROUNDWATER PROCINO PLATING PROPERTY BLADES, SUSSEX COUNTY, DELAWARE

DATE:	1/23/2013	JOB NUMBER:	11-1027.B
DRAWN BY:	EWR	SCALE:	as noted
CHECKED BY:	RCG	FIGURE NO:	2
FILE NO:	11-1027.A-FIGS	SHEET	1 OF 1

TABLE 1  
TOTAL CHROMIUM IN SOIL SAMPLES (mg/kg)  
Procino Plating Facility  
Blades, Delaware

Analysis Name	Units	Method	HA-1 (3-5')	HA-1 (6.5-8.5')	HA-2 (3-5')	HA-2 (6.5-8.5')	HA-3 (3-5')	HA-3 (6.5-8.5')	HA-4 (0-2')	HA-4 (3-5')	HA-5 (0-2')	HA-5 (3-5')	Dry MDL
Chromium	mg/kg	SW-846 6010B	126	199	5.84	52.4	2.12	11.6	37.8	64.8	11.3	14.3	0.140
Moisture	%	SM20 2540 G	2.8	7.0	4.2	7.9	4.1	12.0	3.4	4.8	4.4	3.7	0.50
Moisture	%	SM20 2540 G	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
			HA-6 (0-2')	HA-6 (6.5-8.5')	HA-7 (0-2')	HA-7 (6.5-8.5')	Dry MDL						
Chromium	mg/kg	SW-846 6010B	105	20.3	27.1	29.2	0.151						
Moisture	%	SM20 2540 G	3.0	9.0	2.3	9.3	0.50						

## 1.0 Proposed Sampling and Analyses Plan Table

Sampling Matrix	Sampling Locations and depths	Sample Collection Methodology	DNREC-SIRB Lab Screening	HSCA Laboratory Analysis	Comments/Justification
Surface soil	None	SIRB_SOP_Surface Soil_Sampling	None	None	
Subsurface Soil	None	SIRB_SOP_Subsurface Soil_Sampling	None	None	
Groundwater Monitor Wells	<p><b><u>SHALLOW WELLS:</u></b></p> <p>Sample MW-6, MW-7, MW-8 and MW-9</p> <p>Install and sample 3 new shallow MWs two downgradient and 1 to east side.</p> <p><u>DEEP WELLS:</u> Install / sample 2 (to 3) new 60-ft deep MWs to make 2 sets of well nests: at MW-8 and MW-9 (both down gradient of MW6 -see attached map)</p> <p>Re-sample Domestic Well#8 for chromium</p>	SIRB_SOP_Groundwater_Sampling (using EPA Low-Flow method)	<p>None</p> <p>None</p>	<p>7 wells - total Cr from 2 depths (top and base of screen) in each well to total 14 samples by SW-846 6010B.</p> <p>2 deep wells- 2 samples for total Cr from mid- screen in each well by SW-846 6010B and for total CN by SW-846 9012A.</p> <p><small>Ex. 5 Personal Privacy (PP)</small> domestic well for total Cr</p> <p>SUM: 17 total Chromium and 2 total CN.</p>	<p>Confirm earlier –lack of vertical Cr stratification</p> <p>Delineation of horizontal Cr - 1 on east side of plume and 2 down gradient.</p> <p>Determine vertical flow direction at each well nest (up or down); Determine presence and thickness of clay between upper and lower aquifers in area downgradient of Site; Determine concentration or absence of Cr in deeper aquifer below clay (if any).</p>
Soil gas (V.I)	None	SIRB_SOP_Soilgas_Smpg			



<b>Sediment</b>	None	SIRB_SOP_Sediment_Samp			
<b>Surface Water</b>	None	SIRB_SOP_Surface Water_Sampling			
<b>Other Survey (geophysical)</b>	None	Industry Standard Procedure	None	none	

## 2.0 Proposed Sampling Location Map(s): Include Map(s) showing sampling locations for different environmental media

Figure 1 is attached.

## 3.0 Investigation Derived Waste Management - Describe how investigation derived waste will be managed

**SOIL:** Because soil samples in the plant source area had a maximum chromium concentration of 199 mg/kg, it is considered highly unlikely that soil cuttings at any offsite location will contain chromium at concentrations of potential concern, i.e., above DNREC's Reporting Level / Screening Level of 214 mg/kg. Wells to 25 feet already exist beside the proposed locations for the new deep wells, with total Cr groundwater concentrations of 23.7 ug/L (MW-8 at 23 ft) and below 1.0 ug/L (MW-9 at 25.5 ft). In consideration of those very low ppb chromium levels, the soil cuttings from depths to 25 feet will be spread out on the surface.

However, if DNREC feels that it is warranted, the soil cuttings from the 25 ft to 55 ft depths of the two (3?) HSA wells will be staged on, and covered by, thick plastic sheeting until lab results have been received. One 10-point composite sample will be collected from each well's soil pile and submitted to the lab for total Chromium analysis. If results are below DNREC's Screening level of 214 mg/kg (residential use), the soil cuttings will be spread on the ground surface and seeded.

**GROUNDWATER:** development water from the 5 new wells and the pre-sampling purge water for all 7 Geoprobe wells (4 onsite and 3 offsite) and from 2 (3) new deep wells to be sampled using EPA's Low Flow (Zero Drawdown) methodology, will be contained in 55-gallon drums until groundwater sample lab results have been received.

## 4.0 Health and Safety Plan - Include the Health and Safety Plan for the investigation

The HASP has been previously provided to SIRS for earlier phases of monitor well installation and groundwater sampling.